

Evaluating digital transformation preparedness among Vietnamese enterprises

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ABSTRACT

Amid Vietnam's ongoing digital transformation, this study evaluates the readiness of Vietnamese enterprises for comprehensive digital change, identifying a significant gap in their preparedness for Industry 4.0. The research employs a mixed-methods approach. Initially, in-depth interviews with 10 enterprise leaders uncover detailed perceptions regarding digital capacity and transformation management capabilities, aiming to provide nuanced qualitative insights into the specific challenges and opportunities faced during digital transformation. Following this, a survey of 352 enterprises quantitatively assesses their digital transformation maturity, focusing on digital and transformation management capabilities. The survey's data analysis identifies trends and patterns across different sectors and enterprise sizes. Specifically, it reveals that Small and Medium-sized Enterprises (SMEs) in services are at an early stage of Digital Mastery, while those in manufacturing remain beginners; Private Large Enterprises (PLEs) are early-stage Digital Masters but lag behind Foreign-Invested Enterprises (FIEs). These findings, analyzed through established transformation management theories, highlight the need for targeted strategies to enhance digital readiness, foster innovation, and implement supportive policies to ensure sustainable growth and competitiveness in the digital era.

1. Introduction

The so-called "Digital Transformation" (DT) is being propelled by new and innovative technologies, including cloud computing, the Internet of Things (IoT), blockchain, Artificial Intelligence (AI), Virtual Reality (VR), and Big Data analytics. This fast-moving trend of global digital transformation poses significant challenges as well as brings tremendous benefits to companies (Vinasa, 2019). According to IDG's State of Digital Business Transformation 2018 report, 89% of organizations have adopted a digital-first business strategy, prioritizing digital technology at the core of their business operations and customer interactions (Uwomano, 2024). As highlighted by Yoo and Euchner (2020), a digital-first business strategy extends beyond establishing a digital presence; it entails leveraging technology to enhance operational efficiency, customer satisfaction, and innovation. Adopting a digital-first business strategy often leads to digital transformation or signifies a plan to embark on one, with 60% of companies that have undergone digital transformation creating new business models (IDG, 2018). In Vietnam, a survey conducted during the Vietnam ICT Summit 2019 found that approximately 40.6% of

organizations have a clear understanding of digital transformation and are ready to embark on the digital journey (Vietnam Web Summit, 2019). Additionally, insights from PwC's Vietnam Digital Readiness report released in March 2021 indicate that 90% of respondents anticipate technology will impact their current jobs within the medium term (06 - 10 years), while 83% expect to feel its impact in the short term (03 - 05 years) (PwC, 2021).

In contemporary business, Digital Transformation (DT) is pivotal for organizational success, addressing various aspects such as enhanced customer experiences, agile operations, innovation, data-driven insights, and business model transformation (Gupta & George, 2016). Leveraging digital platforms enables personalized, seamless, and omnichannel interactions (Westerman et al., 2014), while agile operations optimize workflows through automation, data analytics, and cloud computing (Kane et al., 2015). Innovation flourishes in environments fostering experimentation with digital tools (Baiyere et al., 2024), and data-driven insights drive strategic decisions (Bughin et al., 2018). Business model transformation involves adapting to digital opportunities like subscription-based services and platform-based ecosystems (Bharadwaj et al., 2013). The urgency of digital transformation is underscored by the Fourth Industrial Revolution (IR 4.0), necessitating businesses to remain competitive (Ivanov et al., 2019). Digital transformation has evolved from innovation to a necessity for business sustainability, especially highlighted by the disruptions caused by the Covid-19 pandemic (Stock & Seliger, 2016). Prioritizing DT is crucial for organizations to thrive amidst evolving market dynamics in the digital era.

Businesses now see Digital Transformation (DT) as crucial for sustainability (Stock & Seliger, 2016), with the global market expected to reach \$1,548.9 billion by 2027 reflecting a Compound Annual Growth Rate (CAGR) of 21.1% during the forecast period (Research and Markets, 2024). Despite this growth, Gartner forecasts worldwide IT spending to reach \$5 trillion in 2024, an 8.6% increase from 2023 (Gartner, 2023). To justify this increased budget, companies must drive digital adoption concurrently (Gartner, 2023). However, Gartner statistics reveal that only 40% of businesses successfully scale digital transformation initiatives, despite 87% of senior business leaders recognizing it as a company priority (Gartner, 2023). According to a Digital Adoption Survey conducted in 2022 by Userlane, a leading Digital Adoption Platform, 88% of decision-makers in UK businesses with 250 employees or more agree that digital adoption is crucial for productivity and employee experience (Userlane, 2024). Moreover, 92% of these businesses understand that successful digital transformation extends beyond selecting the right solution and managing its integration (Userlane, 2024).

The pressure to adapt to Industry 4.0 technologies has intensified due to the Covid-19 pandemic's disruptive effects on business operations worldwide (Gon et al, 2020; Leaders, 2016). Companies are embarking on a journey toward complete value chain transformation, aiming to become true digital enterprises. However, a significant challenge for enterprises is defining their position in the digital transformation pathway. Previous studies have overlooked the need for a structured approach to evaluate digital and transformation management capabilities comprehensively.

To address this gap, our study introduces and applies a framework proposed by Westerman et al. (2014), which outlines four distinct levels of digital transformation capability. By incorporating this framework, we offer a structured approach for enterprises to assess their digital maturity comprehensively. Our study aims to support enterprises in defining their position

in the digital transformation pathway by reviewing previous research and developing a conceptual model framework. Through an online survey involving 352 managers and executives from various enterprises in Vietnam, we aim to provide a comprehensive understanding of digital transformation. This effort seeks to facilitate informed decision-making and strategic planning, bridging the gap between enterprises' current state and desired digital maturity. Finally, the paper concludes with a synthesis of findings and their implications for future research.

2. Literature review

2.1. Digital transformation definition

Digital Transformation (DT) has emerged as a focal point for researchers, business leaders, and policymakers, given its profound impact on industries and societies globally (Bharadwaj et al., 2013; Piccinini et al., 2015). Despite its significance, the definition of DT remains varied across studies, prompting our research team to analyze and consolidate diverse perspectives to establish the most pertinent definition for our study on assessing DT readiness among Vietnamese enterprises.

Table 1

Digital Transformation Definitions of Previous Studies

No.	Author(s)	Definition
1	Westerman et al. (2014); Westerman et al. (2011)	The use of technology to radically enhance performance or improve the reach of enterprises
2	Fitzgerald et al. (2014)	Digital transformation involves leveraging new digital technologies to make substantial improvements in business operations, such as enhancing customer experiences or streamlining processes
3	Matt et al. (2015)	DT strategy is a blueprint that supports companies in governing the transformations that arise owing to the integration of digital technologies, as well as in their operations after a transformation
4	Piccinini et al. (2015)	DT involves leveraging digital technologies to enable major business improvements, such as enhancing customer experience or creating new business models
5	Bekkhus (2016)	Use of digital technologies to radically improve the company's performance
6	Heilig et al. (2017)	Transformations in organizations that are driven by new enabling IT/IS solutions and trends
7	Hess et al. (2016)	DT involves using digital technologies to change a company's business model, products, or processes. For example, the music industry has seen significant changes due to the rise of Internet-based media

No.	Author(s)	Definition
8	Vial (2019)	DT is about using digital tech to prompt strategic changes in organizations, adjusting how they create value while managing structural and organizational challenges
9	Mergel et al. (2019)	DT spawns fresh business models, displacing traditional service delivery methods, offering opportunities for market expansion, new customer acquisition, and shedding unprofitable segments
10	Peter et al. (2020)	DT aims to enhance entities by leveraging information, computing, communication, and connectivity technologies to instigate significant improvements in their properties
11	Nadkarni and Prügl (2021)	DT involves organizational change propelled by digital technologies, encompassing both a technology-centric and an actor-centric perspective within organizations
12	Thomas and Tee (2022)	Technology emerges as central, in fostering “virtual corporations” like Amazon and Google
13	Schlegel and Kraus (2023)	While data and technology are integral, the velocity of change and interconnectedness are paramount in DT, enabling customers’ dominant role in technology adoption and the convergence of the physical and digital realms

Source. Author’s summary

Examining definitions from previous research (Table 1), common themes emerge: (1) leveraging digital technologies to enhance business models or operations, (2) focusing on firm capability and performance, and (3) fostering the emergence of new business models. Considering these insights, we propose that DT involves leveraging digital technologies to enhance operational capabilities, elevate stakeholder experiences, foster new business models, and ultimately improve firm performance and sustainability.

2.2. Digital transformation within the Vietnam context

The wave of Industry 4.0 (IR 4.0) and its push toward digitally enabled technologies present significant opportunities for Vietnam to establish a more advantageous position within the ASEAN region or, at the very least, to avoid lagging behind in the new digital era (Ivanov et al., 2019). By aligning with Digital Transformation (DT) and the digital economy, Vietnamese businesses can bolster their competitiveness in the market.

Vietnam’s burgeoning digital ecosystem is driving change and opportunities for the country’s transformation to align with global trends and potentially lead to the Fourth Industrial Revolution. The nation is progressing towards establishing a national digital transformation program, anchored by the three main pillars of digital government, digital economy, and digital society. In September 2019, the Party Central Committee issued Resolution No. 52-NQ/TW, outlining policies and guidelines to advance the country’s involvement in IR 4.0, with a focus on expediting digital transformation (The Central Committee, 2019). Prime Minister Nguyen Xuan

Phuc subsequently issued Decision No. 749/QĐ-TTg, approving the national digital transformation program by 2025 with a vision towards 2030 (The Prime Minister, 2020). Under this program, Vietnam aims to rank among the top 50 countries in terms of e-government by 2030, with the digital economy contributing 30 percent to GDP. Additionally, the goal over the next decade is to have over 80 percent of the population possess e-payment accounts and to position the country among the top 30 countries in cybersecurity and safety.

Vietnam's shift towards an innovation-driven model, bolstered by the digital economy, is crucial for sustaining economic growth, as highlighted by Cirera et al. (2021) in the World Bank report "The innovation imperative for developing East Asia." Driving innovation and digital transformation necessitates strategic leadership and management at both the national and provincial levels. The overarching objective is to accelerate digital transformation in response to the global Covid-19 pandemic. Integrating digital literacy and inclusion into central and provincial government strategies is not only vital for Vietnam's economic development but also essential for national and personal security for its citizens.

2.3. The digital mastery framework for assessing DT of enterprises

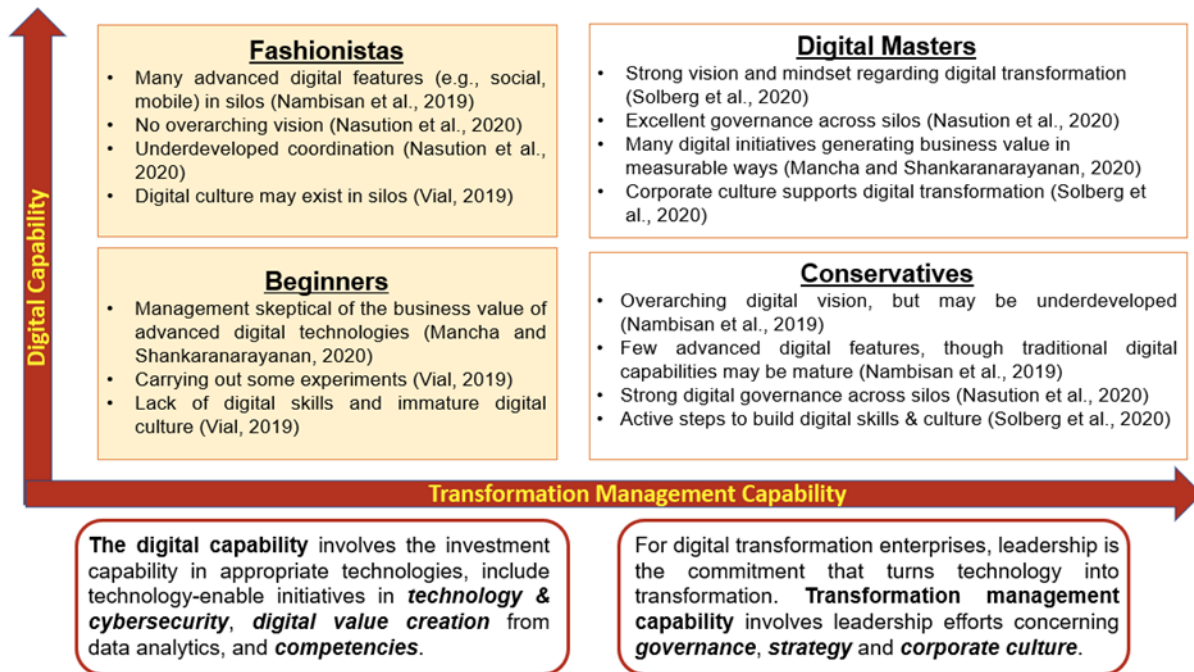
The framework for assessing Digital Transformation (DT) in enterprises emphasizes understanding digital maturity, which involves translating technological innovation into digital capabilities within the company and effectively leading transformations for integration within the organization. MIT (2011) identified four approaches to driving digital transformation: beginners, conservatives, fashionistas, and digirati. Westerman et al. (2014) introduced the concept of "digital maturity," indicating an organization's readiness for digital transformation across technology, people, culture, and processes, correlating with superior corporate performance.

According to the report on Digital Transformation and the role of enterprise architecture (ITU, 2019) by ITU, successful transformation hinges on strategic thinking and change, rather than solely technology. They proposed four levels of digital transformation maturity: digital trailblazer, digital leader, digital follower, and digital laggard. Solberg et al. (2020) identified four mindsets regarding digital transformation initiatives fixed/zero-sum digital mindset (Quadrant 1), fixed/expandable-sum digital mindset (Quadrant 2), growth/zero-sum digital mindset (Quadrant 3), growth/expandable-sum digital mindset (Quadrant 4), aiding in understanding digital mindsets in change initiatives.

These models separate digital maturity into digital capabilities and transformation management capabilities, encompassing leadership, culture, change management, and governance (Cichosz et al., 2020). Adopting frameworks like the 'Four levels of digital mastery' aids in assessing readiness for DT among enterprises, categorizing progress into quadrants (Beginners, Fashionistas, Conservatives, and Digirati or Digital Masters). This categorization allows for the recognition of variations in how 'Digital Masters' construct and manage their digital competence (Cichosz et al., 2020).

Figure 1

The Four Levels of Digital Transformation Capability



Source. The data are from “Leading digital: Turning technology into business transformation” by G. Westerman, D. Bonnet, and A. McAfee, 2014, Harvard Business Press. The data are from “Digital mindsets: Recognizing and leveraging individual beliefs for digital transformation” by E. Solberg, L. E. Traavik, and S. I. Wong, 2020, *California Management Review*, 62(4), pp. 105-124

2.3.1. Digital capability/intensity

Digital capability refers to an organization’s ability to invest in new technologies such as mobile, analytics, and social media to remain competitive in the market and address the evolving needs of both customers and employees. It relies heavily on technological capabilities since most digital opportunities inherently involve a significant technology component (World Bank, 2019). Companies should view investments in technology as opportunities to enhance their operations, encompassing customer engagement, business models, and communication channels.

For these enterprises, emerging innovations like social media, connectivity, and automation aren’t just milestones to achieve or messages to convey to stakeholders. Instead, they serve as vehicles for closer client relationships, staff inspiration, and internal operational enhancements. Digital intensity encompasses technology-enabled initiatives in areas such as technology and cybersecurity, digital value creation through data analytics, and competencies (Correani et al., 2020).

Technology and cybersecurity are measured by evaluating the adoption and integration of advanced technologies and the robustness of cybersecurity measures (Hasani et al., 2023). Key indicators include investment levels in new technologies like mobile, analytics, and social media, the implementation of cybersecurity protocols, the frequency and thoroughness of cybersecurity audits and risk assessments, and the organization’s incident response and recovery capabilities (Hasan et al., 2021).

According to Bordeleau et al. (2020), digital value creation through data analytics is assessed by the organization’s ability to leverage data for decision-making and value generation.

This includes the implementation of data analytics tools and platforms, the integration of data analytics into business processes, the use of analytics for strategic decision-making and performance improvement, and documented success stories or case studies demonstrating value derived from data analytics (Awan et al., 2021).

Competencies are measured by assessing the skills and expertise of the workforce in digital technologies and processes (Oberländer et al., 2020). Indicators include the availability and uptake of training and development programs focused on digital skills, the proficiency levels in key digital technologies among employees, the recruitment and retention of talent with expertise in digital transformation, and the level of employee engagement and participation in digital initiatives (Hernandez-de-Menendez et al., 2020).

2.3.2. Transformation management capability

Transformation management capability pertains to how effectively Digital Transformation (DT) enterprises strategize and oversee their transition into the digital future. In DT enterprises, leadership plays a pivotal role in turning technology into transformation. Leaders inspire change through top-down leadership, setting direction, building momentum, and guiding employees to follow suit. Essentially, these leaders articulate a clear vision of the future, initiate essential actions, and encourage employee involvement in realizing this vision over time (Westerman et al., 2014).

Throughout the transformation journey, leaders drive changes forward, direct activities, and shape behaviors that align with the envisioned future. Their efforts span governance, strategy, and corporate culture, influencing the organization's trajectory (Hirschheim et al., 2020). Governance is measured by the presence of formal structures and processes guiding digital initiatives, such as a digital strategy committee, clearly defined roles and responsibilities, policies for digital risk management and compliance, and regular audits of digital projects (Fenwick et al., 2019). According to Fischer et al. (2020), strategy is assessed by how well the organization's digital vision aligns with its business objectives, including a documented digital transformation roadmap, the integration of digital goals into the business strategy, investment in digital initiatives, and performance metrics specific to digital transformation. Culture is gauged by the organization's openness to innovation and change, indicated by employee engagement in digital projects, the availability of training programs, internal communication strategies promoting digital transformation, and leadership support for digital initiatives (Asif et al., 2024).

3. Methodology

3.1. Research design and sampling strategy

Our research began with an extensive review of literature from reputable journals such as the *International Journal of Management Review* and the *Journal of Information Technology Theory and Application*, focusing on articles published up to 2023. Following protocols by Cacciotti and Hayton (2015), we employed a systematic literature review approach supplemented by backward and forward reference searches to ensure comprehensive data collection.

For qualitative data, we conducted in-depth interviews with 10 managers, using thematic analysis to explore their perceptions of digital capacity and transformation management capability. This involved carefully reading interview transcripts, followed by open coding to identify key concepts and themes, which were iteratively refined through discussions. Conducting interviews with 10 managers is considered sufficient for thematic analysis as it

allows for the identification of key themes and insights while maintaining a manageable data set (Guest et al., 2006).

Additionally, a quantitative survey was conducted among 352 managers and executives from various Vietnamese enterprises, including Foreign-Invested Enterprises (FIEs), State-Owned Enterprises (SOEs), Private Large Enterprises (PLEs), and Small and Medium-sized Enterprises (SMEs). The survey initially targeted 500 potential respondents, but we achieved a response rate of 70.4%, yielding 352 responses. According to Cochran (1977), a sample size of around 350 is adequate for achieving statistical power and representativeness, providing a confidence level of 95% with a margin of error of $\pm 5\%$.

The survey, available in Vietnamese and English, comprised 34 questions addressing dimensions such as Technology & Cybersecurity, Digital Value Creation, Competencies, Governance, Strategy, and Culture (see Table 2). Categorizing enterprises into three main sectors (Manufacturing, Service, and Other) is crucial as digital transformation impacts can significantly differ across sectors (Schwab, 2017). This categorization allows for targeted examination of sector-specific digital transformation dynamics and tailored recommendations.

Table 2

Dimensions of DT Surveyed

Intensities	Dimensions	Measuring item (Modified)
Digital Capability	Technology & Cybersecurity	Data standardization for interdepartmental collaboration
		Networks and platforms work well to allow access to interdisciplinary data sources
		The organization has been piloting new digital technologies
		Multiple digital channels are utilized for data collection
		Products are integrated into digital platforms
		The organization developed its own equipment to ensure cybersecurity
		Internal protocols are established for cybersecurity
		The organization outsources cybersecurity solutions to professional IT suppliers
	Digital value creation from data analytics	The organization appreciates data as assets
		Customer data are analyzed to generate insights
		The organization's digital strategy is driven by customer insights
		Data analytics helps personalize products and service
		Operational data are collected to generate insights for further improvements
		Real-time use of data is adopted for decision-making processes

Intensities	Dimensions	Measuring item (Modified)
	Competencies	The employees are tech-savvy
		The employees are open to learning new technologies
		The organization pays attention to digitally upskilling staffs to eliminate skill gaps
		The executive team for DT shows digital expertise
		Partnerships with other institutions are perceived as an effective channel to enhance employees' digital competencies at the organization
Transformation management capability	Governance	The leadership's awareness of the impacts of DT
		Whether the organization has an officially assigned member to lead the transformation or not
		Sufficient resources are allocated for facilitating the DT process
		The digital strategy is communicated to staff at different levels
		Interdepartmental collaboration is ensured
	Strategy	The strategy for DT is consistent
		Plan for DT is well established
		The business model is revised to better suit the demand of DT
		Roles and responsibilities are defined for DT
		KPIs are established and well-defined to measure the outcomes of DT
	Culture	A knowledge-sharing culture exists in your organization
		The organization is open to change and innovation
		The readiness to use Information communication technology (ICT) is one of your organization's values
		Digital transformation is embraced by your organization
		A bottom-up co-creation culture is your organization's common practice

Source. Author's summary

This mix-method allowed for the triangulation of findings, enhancing the validity and reliability of the results. The use of in-depth interviews provided rich, detailed insights into participants' perceptions and experiences, while the survey enabled the collection of quantitative data from a larger sample, facilitating the generalization of findings to the broader population of enterprises in Vietnam. By combining these methods, we were able to gain a more nuanced understanding of digital transformation processes and practices in Vietnamese enterprises.

Our central research question was “How far along are enterprises on the path toward digital transformation?” prompting enterprises to self-assess their readiness levels. Participants were selected based on their decision-making authority, relevant knowledge about digital transformation, and evidence of digital transformation activity within their organizations. Enterprises were categorized into Manufacturing, Service, and Other sectors to allow for targeted examination of sector-specific digital transformation dynamics. This categorization facilitates the identification of industry-specific challenges and opportunities, enabling tailored recommendations (Schwab, 2017).

Our sampling strategy combined purposive and convenience sampling methods. Purposive sampling ensured diverse organizational contexts, while convenience sampling facilitated recruitment based on availability and willingness to participate. Although our findings may not be fully generalizable to all Vietnamese enterprises, the robust sample size and diverse participant pool enhanced the validity and reliability of our research outcomes.

3.2. Data analysis

Survey data were processed using SPSS software, focusing on descriptive statistical analysis. Mean scores and frequency percentages were calculated to analyze the data. Mean scores for each statement were based on a 5-level Likert scale (Poor, Fair, Good, Very Good, Excellent), providing insights into respondents’ perceptions. Frequency and percentage analyses were also conducted for closed and open-ended questions.

Data processing in SPSS involves several steps. Data cleaning procedures were implemented to remove invalid or incomplete responses, ensuring dataset reliability. Data coding translated respondents’ answers into numerical values, facilitating data entry and analysis. Each question was defined as a variable within SPSS, enabling appropriate data manipulation.

The compiled data underwent statistical analysis to meet the predefined analysis goals. Specifically:

The weighted average score (mean) was evaluated to assess the overall responses to each survey item. The weighted average score was calculated using the formula, taking into account the weight of each element in the sample set:

$$\bar{X} = \frac{\sum_{k=1}^n a_k x_k}{N} \quad (1)$$

In the provided formula, x_1, x_2, \dots, x_n represent the n elements in the sample set; a_i denotes the weight of each element x_i . N represents the total number of elements in the sample. Applying the weighted average score is appropriate for this type of survey as it accounts for the varying importance of different items and responses (Bryman & Cramer, 2012).

The evaluation of the results for each content based on the average score follows the criteria below:

- 1 - 1.50: Poor
- 1.51 - 2.50: Fair
- 2.51 - 3.50: Good
- 3.51 - 4.00: Very Good
- 4.01 - 5.00: Excellent

Using a 5-point Likert scale facilitates the analysis of attitudes and perceptions in a structured manner, making it a suitable tool for this research context (Likert, 1932). The justification for evaluating the average score using the specified ranges is based on established standards for interpreting Likert scale data. These ranges offer a clear and intuitive framework for categorizing respondents’ perceptions of digital transformation capabilities. Assigning qualitative descriptors such as “Poor,” “Fair,” “Good,” “Very Good,” and “Excellent” to the score ranges enables easy interpretation and comparison of results. This approach aligns with best practices in survey analysis and facilitates meaningful insights for stakeholders and decision-makers.

4. Results and findings

4.1. Descriptive statistics

A profile of the study participants and their respective organizations follows:

Table 3

Profile of the Study Participants

Categories	Amount	Weight
Roles		
Upper Management	98	28%
Middle Management	112	32%
Junior Management	108	31%
Staff	34	9%
Total	352	100%
Types		
Foreign-invested Enterprises	69	20%
State-owned Enterprises	57	16%
Large Private Enterprises	103	29%
Small Medium-sized Enterprises	123	35%
Total	352	100%
Number of years		
Less than 05 years	101	29%
05 - 10 years	89	25%
11 - 20 years	115	33%
Over 20 years	47	13%
Total	352	100%

Source. Author’s summary

- 60% of participants were middle and upper managers in their organization, indicating that the insights gathered are primarily from those who have significant influence and decision-making authority within their organizations. This high level of managerial representation suggests that the findings of the study are likely reflective of strategic perspectives and can inform organizational policies and practices related to digital transformation.

- 35% of participants worked in SMEs, followed by large private enterprises (29%), FIEs (20%), and SOEs (16%). This diversity allows for a comprehensive analysis of digital transformation readiness across various organizational structures, providing a broader understanding of sector-specific challenges and opportunities.

- The majority of firms (58%) were established between 05 and 20 years, indicating a significant presence of mature companies. The presence of 29% of young enterprises (less than 05 years) and 13% of long-established companies (over 20 years) offers a varied landscape of digital maturity levels. Mature companies might have more established processes but face challenges in agility, whereas younger companies may be more adaptable but less experienced in implementing comprehensive digital strategies.

4.2. Survey results analysis

4.2.1. Examining the focused areas and goals of DT

The survey results are examined to understand how different types of enterprises focus on various areas and goals of Digital Transformation (DT). The comparison across State-Owned Enterprises (SOEs), Small and Medium-Sized Enterprises (SMEs), Private Large Enterprises (PLEs), and Foreign-Invested Enterprises (FIEs) provides insights into their strategic priorities and approaches to digital transformation.

Table 4

The Focused Areas and Goals of DT Across Different Types of Enterprises

	SOEs	FIEs	SMEs	PLEs
The focus DT areas				
Customer Experience	21%	80%	54%	51%
Operational Process	75%	52%	39%	46%
Employee Experience	39%	59%	59%	57%
Product Feature	44%	55%	45%	65%
The DT goals				
Workflow optimization	72%	62%	31%	51%
Collaboration optimization	35%	86%	53%	77%
Information Management Optimization	30%	72%	28%	50%

Source. Author's summary

State-Owned Enterprises (SOEs): SOEs predominantly focus on enhancing operational processes, with 75% of their DT efforts directed toward this area. This indicates a strong emphasis on improving internal efficiencies and automating routine tasks to reduce bureaucratic hurdles. The significant weight given to workflow optimization (72%) further supports this goal,

highlighting the need to streamline complex operations. Additionally, SOEs also pay attention to product features (44%) and employee experience (39%), suggesting a balanced approach to both internal efficiency and innovation. Improving employee experience is essential for boosting satisfaction and engagement, which can lead to increased productivity and innovation. The focus on collaboration optimization (35%) and information management optimization (30%) underscores SOEs' commitment to fostering better communication and data management within their large, structured organizations. These insights align with the study's objective of understanding how enterprises streamline operations through digital transformation.

Small and Medium-Sized Enterprises (SMEs): SMEs demonstrate a strategic focus on customer and employee experiences, with 54% and 59% of their DT efforts directed toward these areas, respectively. This highlights SMEs' recognition of the importance of satisfaction and engagement in driving innovation and competitiveness. The significant emphasis on product features (45%) indicates a need to continuously enhance offerings to stay competitive. In terms of goals, SMEs prioritize collaboration optimization (53%) and workflow optimization (31%), showing a strategic focus on improving teamwork and operational efficiency, which is crucial for overcoming resource constraints. Information management optimization (28%) further supports their goal of utilizing data effectively to drive decision-making. The focus on these areas aligns with the objective of identifying how SMEs leverage digital transformation to remain agile and innovative.

Private Large Enterprises (PLEs): PLEs place a substantial emphasis on product features (65%), reflecting their commitment to integrating digital capabilities into their offerings to meet customer expectations and maintain competitiveness. Employee experience (57%) and customer experience (51%) are also significant focus areas, indicating a holistic approach to digital transformation that includes enhancing the workforce and customer satisfaction. Despite operational processes receiving a lower weight (46%), it still reflects PLEs' intent to streamline internal operations. The prioritization of collaboration optimization (77%) highlights the importance of fostering a collaborative culture, which is crucial for driving innovation and operational excellence. Workflow optimization (51%) and information management optimization (50%) are also targeted, underscoring a balanced approach to improving processes and leveraging data for strategic decisions. These findings align with the study's objective of exploring how larger enterprises drive innovation through digital transformation.

Foreign-Invested Enterprises (FIEs): FIEs prioritize customer experience, dedicating an impressive 80% of their DT efforts to this area. This strong focus reflects their strategic priority on enhancing customer satisfaction to drive organizational performance and competitiveness. Employee experience (59%), product features (55%), and operational processes (52%) are also significant focus areas, indicating a comprehensive approach to digital transformation that balances internal efficiency and external competitiveness. The substantial emphasis on collaboration optimization (86%) highlights FIEs' commitment to fostering a collaborative organizational culture, which is essential for innovation and operational excellence. Workflow optimization (62%) and information management optimization (72%) further support their efforts to streamline operations and enhance data-driven decision-making. These findings align with the study's objective of understanding comprehensive digital strategies in diverse enterprise contexts.

The comparative analysis of DT focus areas and goals across different types of enterprises reveals distinct strategic priorities. SOEs and SMEs primarily aim to improve operational processes and employee experience to optimize workflow and collaboration. PLEs

and FIEs balance their focus across all DT areas, with a strong emphasis on customer experience. This comparative approach provides a clear understanding of how various enterprises are navigating their digital transformation journeys and aligning their strategies with broader organizational objectives.

4.2.2. DT and transformation management Intensity by sector

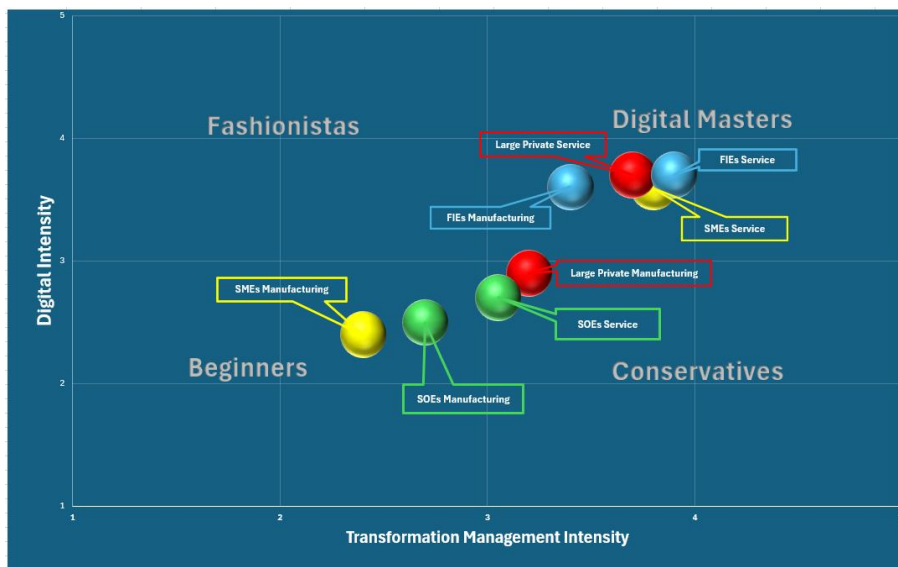
When analyzing DT maturity by sector, a notable disparity between manufacturing and service firms emerges (Figure 2). Our data indicates that service enterprises, leveraging their digital capability and DT management capability, surpass their manufacturing counterparts in the DT journey. Conversely, manufacturing enterprises lag, predominantly remaining at the beginner stage of the journey.

Several factors contribute to the sluggish progress of manufacturing firms in Vietnam. These include outdated technology, insufficient application of cybersecurity measures, inadequate competencies, weak leadership, and subpar corporate culture. Among the six dimensions evaluated, Strategy is the only dimension slightly above average, although it is insufficient to compensate for shortcomings in other areas. Overall, manufacturing enterprises significantly trail behind service firms in DT advancement.

Upon further examination of the four types of enterprises, it is intriguing to observe that all service firms, with the exception of SOEs, reside in the Digital Master area. Conversely, state-owned manufacturing firms and SMEs exhibit the lowest scores, placing them in the Beginners quadrant. This highlights a stark contrast in DT maturity levels across different enterprise types and sectors.

Figure 2

DT Maturity by Sector



Source. Author's summary

When examining DT maturity by type of enterprise, distinct differences are evident. The research findings highlight that PLEs and FIEs are situated in the Digital Master area. Conversely, SMEs and SOEs remain categorized as Beginners. Despite being categorized as Beginners, both SMEs and SOEs demonstrate average scores of capabilities that are not exceptionally low. This suggests the potential for advancement to higher positions in the DT journey.

Figure 3*DT Maturity by Type of Enterprise*

Source. Author's summary

The data gathered from surveys and interviews underwent analysis to evaluate the DT maturity levels across various types of enterprises. This process involved comparing their performance across key DT dimensions and aligning them with a maturity model. Enterprises were then classified based on their scores in these dimensions, with higher scores indicating a more advanced DT maturity level. The findings were visualized in Figure 2, showcasing the DT maturity categorized by sector, highlighting discrepancies between manufacturing and service firms. Similarly, Figure 3 illustrates the DT maturity by enterprise type, providing insights into the specific challenges and opportunities encountered by each. This comprehensive analysis, covering factors like technology adoption, organizational culture, leadership, and strategic alignment, revealed distinct highlights for the different types of firms operating in Vietnam as follows:

- FIEs outperform other types due to their technological advantages, stronger financial capability, and management capability.
- SOEs, despite representing a significant portion of Vietnam's GDP, trail behind other enterprise types in DT maturity. While service-oriented SOEs show slight progress, they still fall within the Conservative category, indicating a need for substantial improvement.
- SMEs exhibit a fragmented distribution. While SMEs in the services sector are positioned at the early stage of the Digital Master, those in the manufacturing sector remain in the Beginners area. This discrepancy is attributed to the greater agility and flexibility of SMEs in the services sector compared to those in manufacturing.
- PLEs are at the early stage of Digital Master, although they trail behind FIEs. Notably, while large firms in the services sector have begun to reach the Digital Master level, manufacturing enterprises are still positioned in the Conservative zone.

The classification of enterprises into different maturity levels is based on a rigorous analysis of data collected through the study's methodology. By linking specific findings to

broader trends and industry benchmarks, the classification provides valuable insights into the DT landscape across different types of enterprises in Vietnam.

4.2.3. Transformation management capability of Vietnam enterprises

The analysis of transformation management capability among Vietnamese enterprises reveals crucial insights into how Governance, Strategy, and Culture influence Digital Transformation (DT) initiatives. This evaluation helps to measure how well enterprises manage their transformation processes and aligns with the objectives of the study, which aims to understand and compare the strategic focus and effectiveness of different types of enterprises.

Governance:

Governance is assessed by examining leadership structures, decision-making processes, and accountability mechanisms within enterprises. FIEs demonstrate exemplary governance with a mean score of 4.03, indicating strong leadership and effective decision-making frameworks. This high score suggests that FIEs are well-equipped to steer DT initiatives efficiently. In contrast, SOEs score the lowest at 2.52, highlighting deficiencies in their leadership structures and decision-making processes that may hinder successful DT implementation. PLEs and SMEs score 3.69 and 2.85, respectively, showing moderate governance effectiveness that still requires improvement for better DT outcomes.

Strategy:

Strategy is evaluated based on the clarity and alignment of transformation initiatives with organizational objectives. FIEs lead with a mean score of 3.77, reflecting their strategic clarity and well-aligned DT efforts. This suggests that FIEs have a clear vision and roadmap for their digital initiatives, ensuring they support broader organizational goals. SOEs, with a mean score of 3.24, need to refine their strategic planning processes to enhance DT effectiveness. PLEs and SMEs, scoring 3.35 and 3.19, respectively, demonstrate a moderate strategic focus that aligns reasonably well with their DT goals but could benefit from more precise alignment.

Culture:

Culture is measured by the extent to which an organization fosters innovation, adaptability, and openness to change. FIEs score the highest with a mean of 3.72, indicating a supportive organizational culture for DT. This suggests that FIEs encourage innovation and are receptive to new technologies and processes. Conversely, SOEs score the lowest at 2.59, pointing to cultural barriers that could impede the adoption of DT initiatives. PLEs and SMEs show better cultural alignment with scores of 3.66 and 2.81, respectively, but still have room for improvement to fully support DT.

Table 5

Transformation Management Capability of Vietnam Enterprises

Transformation Management Capability	SOEs	FIEs	SMEs	PLEs
Governance	2.52	4.03	2.85	3.69
Strategy	3.24	3.77	3.19	3.35
Culture	2.59	3.72	2.81	3.66

Source. Author's summary

The data underscores the pivotal role of transformation management capability in driving DT initiatives. FIEs emerge as frontrunners in governance, strategy, and culture, underscoring their proactive approach to navigating the complexities of digital disruption. Conversely, SOEs face significant challenges in these areas, highlighting the need for strategic interventions to enhance leadership, strategic planning, and organizational culture to foster a conducive environment for successful DT initiatives.

4.2.4. Digital capability of Vietnam enterprises

The evaluation of digital capability within Vietnamese enterprises focuses on three key areas: Technology and Cybersecurity, Digital Value Creation through Data Analytics, and Competencies. This analysis aligns with the study's objectives by providing a detailed assessment of how these capabilities influence DT success.

Technology and cybersecurity:

Technology and Cybersecurity are measured by examining the robustness of technological infrastructure and the effectiveness of cybersecurity protocols. FIEs excel with a mean score of 3.75, indicating strong technological foundations and stringent cybersecurity measures. This high score reflects FIEs' ability to protect digital assets and ensure operational continuity. SOEs, with a score of 2.48, show significant room for improvement in technology infrastructure and cybersecurity, which are critical for supporting DT initiatives. SMEs and PLEs score 2.72 and 3.33, respectively, highlighting moderate technological capabilities that need enhancement to fully support DT.

Digital value creation through data analytics:

This dimension assesses how well enterprises leverage digital technologies to create value through data analytics, customer engagement, and revenue generation. FIEs lead with a mean score of 3.88, showcasing their proficiency in using data analytics to drive customer value and innovation. SOEs, scoring 2.62, indicate a need for better utilization of digital technologies to create value. SMEs and PLEs, with scores of 3.10 and 3.55, respectively, demonstrate moderate capabilities in digital value creation but have the potential for further improvement.

Competencies:

Competencies are evaluated by the digital skills and readiness of the workforce. FIEs again score highest with a mean of 3.66, reflecting their strong emphasis on digital skills development and continuous learning. This suggests that FIEs prioritize building a digitally competent workforce, which is crucial for sustaining DT efforts. SOEs, scoring 2.41, need significant improvement in workforce competencies to support DT. SMEs and PLEs, with scores of 2.77 and 3.53, respectively, indicate varying levels of workforce readiness that require further enhancement.

Table 6

Digital Capability of Vietnam Enterprises

Digital capability	SOEs	FIEs	SMEs	PLEs
Technology and cybersecurity	2.48	3.75	2.72	3.33
Digital value	2.62	3.88	3.1	3.55
Competencies	2.41	3.66	2.77	3.53

Source. Author's summary

This evaluation highlights the strategic edge of FIEs in digital capabilities, positioning them as frontrunners in DT. Their investment in advanced technology, robust cybersecurity, data analytics, and workforce development underscores their preparedness to navigate digital challenges and seize growth opportunities. In contrast, SOEs need substantial improvements in all areas to support successful DT, while SMEs and PLEs show moderate capabilities that can be further enhanced to maximize DT benefits.

5. Discussion

The investigation into digital capability and transformation management among Vietnamese enterprises reveals nuanced implications for different types of businesses. For Private Large Enterprises (PLEs), which often possess substantial resources and organizational capabilities, the findings underscore the importance of leveraging their existing strengths to drive digital transformation initiatives. PLEs have the potential to serve as pioneers in digital innovation within the Vietnamese business landscape, given their relatively robust financial backing and managerial expertise. By strategically allocating resources towards digital initiatives and fostering a culture of innovation, PLEs can lead the charge in adopting cutting-edge technologies, optimizing business processes, and enhancing customer experiences to maintain their competitive edge.

On the other hand, the findings suggest that Foreign-Invested Enterprises (FIEs) possess inherent advantages in digital capability owing to their access to advanced technologies, global best practices, and managerial expertise. As such, FIEs are well-positioned to capitalize on digital transformation opportunities and drive innovation within their respective industries. By leveraging their technological prowess and strategic partnerships, FIEs can spearhead digital initiatives, establish industry benchmarks, and catalyze digital adoption across the broader business ecosystem. Furthermore, FIEs can serve as catalysts for knowledge transfer and skill development, nurturing a digitally savvy workforce capable of steering organizations toward sustainable growth in the digital era.

Conversely, State-Owned Enterprises (SOEs) and Small to Medium-sized Enterprises (SMEs) face unique challenges and opportunities in the realm of digital transformation. SOEs, often characterized by bureaucratic structures and legacy systems, may encounter obstacles in embracing digitalization due to institutional inertia and resistance to change. However, the findings highlight the imperative for SOEs to embark on digital transformation journeys to enhance operational efficiency, improve service delivery, and remain competitive in an increasingly digitalized marketplace. By prioritizing digital initiatives and cultivating a culture of innovation, SOEs can modernize their operations, unlock new revenue streams, and drive economic growth.

Similarly, SMEs, while agile and adaptable by nature, may lack the resources and expertise to fully harness the benefits of digital transformation. Nevertheless, the findings emphasize the critical role of SMEs in driving economic development and innovation in Vietnam. By embracing digitalization and leveraging affordable technologies, SMEs can enhance their competitiveness, expand market reach, and unlock new growth opportunities. Government support, access to digital infrastructure, and capacity-building initiatives can play a pivotal role in empowering SMEs to embark on successful digital transformation journeys, driving inclusive growth and prosperity across the economy.

The implications of the findings underscore the diverse challenges and opportunities facing different types of enterprises in Vietnam's digital transformation landscape. By

recognizing their unique strengths and addressing inherent limitations, businesses can navigate the complexities of digitalization and capitalize on emerging opportunities to drive sustainable growth and innovation in the digital era.

6. Conclusion and recommendation

The study's findings offer valuable insights into the Digital Transformation (DT) landscape of Vietnamese enterprises, providing a conceptual model for evaluating their digital maturity and priorities. Through a quantitative assessment conducted via surveys among various enterprises in Vietnam, the study delves into their digital maturity levels, DT priorities, and key factors influencing the DT process. Notably, Foreign-Invested Enterprises (FIEs) emerge as frontrunners, showcasing superior performance attributed to their technological advantages, stronger financial capabilities, and management expertise. Conversely, State-Owned Enterprises (SOEs) lag behind, indicating a pressing need for significant advancements in their digital capabilities.

Moreover, the study unveils a fragmented distribution among Small and Medium-sized enterprises (SMEs), with those in the services sector positioned at the early stage of Digital Master while their counterparts in manufacturing trail behind in the Beginners area. Large enterprises, although making strides toward the Digital Master stage, still fall short compared to FIEs in terms of digital maturity. While the roles of customer experience, operational processes, and business models are validated by participating enterprises, some sources of pressure from customers, employees, and competitors lack confirmation or sufficient evidence, warranting further exploration in future studies.

Therefore, future research endeavors should adopt both quantitative and qualitative approaches to delve deeper into the sources of pressure and examine the roles of customers, employees, and competitors in driving digital transformation within Vietnamese enterprises. Additionally, efforts should be made to assess digital readiness within government settings before undertaking digital transformation initiatives. Future research should leverage this framework to assess readiness within government settings before embarking on digital transformation initiatives. Public sector organizations should prioritize understanding their community's readiness for digital transformation, considering that much of the community will interact with public sector digital service models. Incorporating objectives to assess community digital literacy within digital strategies can facilitate more inclusive and effective digital transformation efforts within the public sector.

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